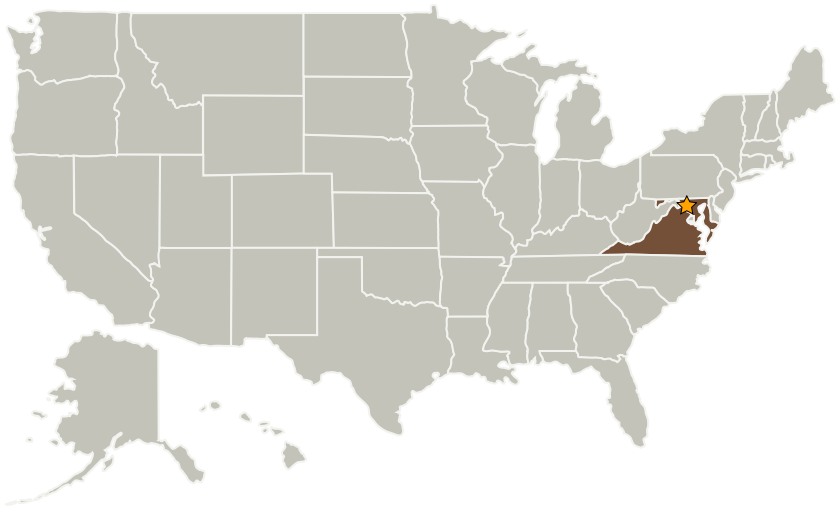
Development of a Tethered Formation Flight Testbed for ISS, Phase II

Completed Technology Project (2004 - 2006)

Project Introduction

We propose an innovative, cost-effective flight experiment that will not only reduce the technology risk for future NASA missions but also take full advantage of the unique capabilities available on the International Space Station (ISS). For our Phase II effort, we plan to modify the Synchronized Position, Hold, Engage, and Reorient Experimental Satellites (SPHERES) system to serve as an on-orbit testbed for Tethered Spacecraft Interferometer (TSI) autonomous software technologies. The SPHERES system, developed by Payload Systems Inc. and the MIT Space Systems Laboratory, is currently scheduled for its first mission aboard the ISS in 2005 to demonstrate metrology, formation flight, and autonomy algorithms. The modifications proposed here would include the addition of a tether reel, momentum wheels, and software modules to the existing SPHERES satellite system. These modifications would enable several new functions, including coarse spacecraft formation initialization, deployment and retraction, and multi-stage precision pointing control, as would be needed for tethered satellite constellations such as the NASA's Submillimeter Probe of the Evolution of Cosmic Structure (SPECS) mission. Our proposed effort would result in a flight-identical qualification hardware and software at a small fraction of the typical development cost.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Aurora Flight Sciences Corporation	Supporting Organization	Industry	Cambridge, Massachusetts

Primary U.S. Work Locations	
Maryland	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.1 Logistics Management